Cement MILL SECTION of

Concrete

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Manufacture of Alumina Cement in Europe

In spite of the great technical interest attaching to the new quick-hardening cements of *ciment fondu* type, there has been up to now an entire lack of published data, in any language, concerning the details of their manufacture. Few chemists or engineers have had opportunity to study the subject on the ground, and none of these few has had, up to the present time, any reason or necessity for discussing publicly the result of his studies.

The slow but orderly procedure of the United States Patent Office has at length placed a rather interesting summary of the matter at the disposal of the American technical public. This comes in the shape of the introductory statement or "specifications" to one of the two so-called Fer-Al[1] patents granted on May 5 to E. C. Eckel of Washington, D. C.

From the specifications to the main Fer-Al patent we extract verbatim the following paragraphs. As the records show, these were prepared early in 1924, and their extreme frankness of statement and definiteness of outline gives them a value above that of statements made primarily for publication.

Alumina cements, or ciment fondu, differ from all previous cements in their composition, carrying from 30 to 50% lime, from 30 to 50% alumina, and not over 20% of silica and iron oxide together. They differ from previous cements in their technical properties, being extremely resistant to chemical attack, and giving test strengths at 24 hours from five to twenty times as great as those reached by portland cements.

With these technical advantages, alumina cement would obviously replace portland cement for all uses, provided it can be supplied at a cost not markedly higher than that of its competitor. At present, the best mills produce ciment fondu at costs ranging from 2½ to 3 times that of portland cement. These costs are due to defects in the processes employed, and to restriction of the raw materials used in an unnecessary and very expensive way. In my improved process, as described below, these defects and restrictions are eliminated. With this new process alumina cements can be supplied in most of the important cement markets of the world at a cost lower than that of portland cement.

After over fifteen years of steady working, the alumina cement industry in France, where alone it has been commercially practiced, has reached a condition of current practice that may be described, in detail, as follows:

Aside from a few unsuccessful experimental plants, all the alumina cement or ciment fondu produced commercially anywhere in the world today is made in small vertical furnaces, ranging from 30 to 45 in. in diameter, and from 10 to 15 ft. high. They are water jacketed, have no regenerative stoves, are driven with a light blast which is slightly heated, and are run on coke. Their ratio of height to diameter, a factor of prime importance, ranges from 3:1 up to 4:1. Their fuel consumption ranges between 25% and 33⅓% of the weight of salable produce. Their output ranges from 10 to 30 tons of saleable product per day.

Raw Materials: The raw materials used everywhere are (a) bauxite and (b) burned lime or quicklime—not crude limestone. The bauxite is a good grade ore, ranging as shown below in actual analysis:

Silica	4.30	1.50	8.20	1.90
Iron Oxide	14.48	14.58	13.70	9.38
Alumina	66.48	70.22	57.80	64.40

It will be seen that this ore is salable to the aluminum and other industries, so that the alumina cement trade is bidding against important uses for its raw material, and consequently pays a high price per ton for its bauxite.

The lime used is low silica; it is burned, prior to charging, to ensure better combination of the cement-forming ingredients: this procedure is necessary in the type of furnace heretofore used.

The lime and bauxite are mixed, prior to charging; in part, indeed, the charge is made up of fine bauxite and lime actually briquetted together; this care and expense in mixing is also necessitated by the inefficiency of the burning process employed.

Operation: The coke being charged in layers, followed by a layer of mixed lime and bauxite, the gradual burning melts the charge and permits the melted material to sink down to the bottom of the furnace. The cement is tapped off as a continuous stream of molten matter, which is cooled, crushed and ground to powder. This powder is the finished *ciment fondu* or *alumina cement* of trade.

But the grinding is complicated, in existing practice, by the presence of more or less metallic iron scattered as globules or masses throughout the cooled cement mass. This is due to the reduction of part of the iron oxide contained in the charge. Part of the iron so reduced sinks directly to the bottom of the furnace, and can be tapped separately and used or sold as iron. But the small mass of this separated iron causes its rapid cooling, and frequent freezing up in the furnace; while both the smallness of the iron mass and the system of continuous tapping prevent a clean separation of all of the reduced iron from the cement. The consequence is that globules of iron, as above noted, are always present in the cement as tapped off—and these necessitate expensive magnetic or other separation before the cement can be put through the fine grinding machinery.

The outline above given suggests clearly enough the points in which existing practice is, in my judgment, defective. These defects involve both irregularity in the character of the product, and expense in its manufacture. The chief defects may be noted as follows:

a. High fuel consumption per unit of salable product.
b. Necessity for use of high grade bauxite.
c. Necessity for use of burned lime.
d. Necessity for prior mixing of lime and bauxite.
e. Freezing of iron metal at base of furnace.
f. Necessity for magnetic separation of included iron globules.
g. Segregation and irregularity in composition of product.

Taken together, these defects involve very heavy expenses in fuel, raw materials, grinding costs and labor; they involve also, at times, defects in the regularity of composition of the cement, or in its quality.

These defects are remedied by my invention and the improvements noted below and claimed in this application result in the production of alumina cement or ciment fondu of superior quality at a cost far lower than has ever been attained in any existing mill, and the invention includes the following features:

Furnace: In place of a small furnace, with height only 3 to 4 times its diameter, I use a high furnace, with lines much like those of an iron blast furnace, its height being at least five times and preferably eight times its diameter. This is preferably equipped with its own regenerative stoves, with gas recovery, and with a top designed to reduce dusting. The increased ratio of height to diameter gives complete combination of the constituents of the charge, and prevents the segregation always a bad feature of the short furnace now used.

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[1] The Fer-Al process is so-called in distinction from the earlier-patented Titan process. The Fer-Al patents cover improved methods of manufacturing alumina cements, of the *ciment fondu* type, in either electric or blast-furnaces. The Titan process, it will be recalled, covered the manufacture of an entirely new type of cement, depending on the presence of lime titanates for its intense resistance to chemical attack and for its other interesting technical properties.

Raw materials: In place of high grade bauxite and quicklime, I make use of far cheaper raw materials. I use crude limestone in place of lime, and bauxite which may be of low grade, and deliberately add iron ore to the mix in order to carry up the iron content above the amount carried by even the most ferruginous bauxite. This iron addition has three beneficial and novel results. It aids in fluxing in the furnace, it gives a larger mass of metallic iron so that freezing is eliminated, and it adds greatly to the salable tonnage per ton of fuel, thereby reducing cost of the cement. A typical mix includes equal parts of limestone and bauxite and preferably from 25 to 50% iron ore, which latter may be an oxide or carbonate of iron, indifferently, provided it carries less than 10% silica. To this is added coke in sufficient quantities.

The raw materials are capable of modification to suit available conditions. Thus low grade or aluminous low silica iron ore and limestone may be used to form the mix, which, when treated as set forth in a blast furnace, will result in a cement slag containing alumina and lime, with a by-product of metallic iron.

All these benefits are accomplished actually by the use of cheap ore and commoner raw materials than can at present be employed in existing practice. Further, it is no longer necessary to briquette or even mix the limestone and bauxite together prior to charging; I prefer to charge them separately, from separate stock piles, so as to make the mechanical handling more simple and efficient, and to reduce the amount of human labor now necessary per ton of product.

Operation: In operating methods I replace the system of continuous tapping, as now practiced, by discontinuous tapping, thereby permitting the reduced iron to separate itself cleanly from the lighter molten cement. This eliminates the presence of iron globules in the cooled cement, and removes the necessity for the expensive and inconvenient magnetic separation of those globules now necessary in existing practice.

When a blast furnace of sufficient height to permit the various chemical reactions and combinations to be carried out completely is charged with coke or other fuel and with limestone, bauxite and iron ore as described in my process, the first effect of the furnace heat will be to dehydrate the bauxite and to decarbonate the limestone. These two actions will take place in the upper part of a high furnace as described. As the charge sinks in the furnace, reduction of the iron oxide or carbonate takes place followed by a combination of lime (resulting from the limestone) with the alumina and silica and a portion of the iron oxide, derived from the bauxite and the iron ore. As the molten material flows downward in the furnace, the reduced metallic iron separates from the lighter lime—alumina—silica—iron oxide compounds that have been formed. The molten iron sinks to the bottom because of its higher specific gravity and separates very cleanly from the lighter cement-forming compounds provided, as in this process, there is sufficient bulk of iron available and sufficient time given between the intervals of tapping to permit such a clean separation. The molten cement-forming mass is tapped off at a slightly higher level. The iron may be run into pigs as usual in iron manufacture; while the molten cement-forming material is cooled, crushed, and ground to powder in the proper machinery.

The allowed claims of the two Fer-Al patents now granted are as follows:

The method of making cement and iron, comprising charging into a furnace calcareous, aluminous and ferruginous materials in such proportions as to constitute a charge containing after loss of its volatile constituents, not less than 25 nor more than 55% of lime, or of lime and magnesia together, not less than 25 nor more than 50% of alumina, nor more than 10% of silica, and not less than 10% of iron oxide, fusing such a charge to the point of complete melting of all of its constituent raw materials, in a blast or electric furnace, allowing sufficient time for separation of the reduced metallic iron and the lighter cement-forming compounds, tapping off the iron and the cement-melt separately, and grinding the latter to powder.

The process for making cement comprising the complete fusion and subsequent cooling and grinding of a properly proportioned mixture of calcareous, aluminous and ferruginous materials, the proportions of the mixture being such as to produce a final product containing between 25 and 50% lime, between 25 and 50% alumina, between 3 and 10% iron oxide, and not less than 10% nor more than 20% of silica and iron oxide together.

The process of producing iron and alumina cement, comprising fusing a mixture of iron bearing ore low in silica, and calcareous materials in such proportions that the resulting slag will contain a relatively high proportion of alumina and less than 15% of silica, separating the reduced metallic iron and the slag, and cooling and grinding the latter.

The process of producing iron and cement, comprising fusing a mixture of aluminous iron ore low in silica and limestone, in such proportions that the slag will contain approximately equal quantities of alumina and lime and less than 15% of silica, separating the resulting metallic iron and slag, and cooling and grinding the latter.

The process of producing iron and alumina cement, comprising fusing a mixture of aluminous low silica iron ore with calcareous material, separating the reduced metallic iron and the slag, and grinding and cooling the latter.

Cement Fondu Industry in France

By Theodore Wolfram

Paris, France

Since the Lafarge French patent for producing aluminous cement has fallen into public domain there is an ever increasing demand for that product throughout continental Europe.

It made its first appearance abroad just after the war when an associated company in England was able to induce the use of *ciment-fondu* in various public works in London and Glasgow. Whether the time agreement had run out or not is not quite clear but it is announced that a British company is erecting a plant for its production in France in the lower Rhone valley.

The Lafarge plant at Le Teil on the Rhone and another in the French Alps are still operating under full head but the British plant which will soon be in operation is located even more accessibly to the bauxite deposits of the region of the Herault.

It is worth mentioning that these bauxite deposits west of the Rhone represent a lower grade ore than those of the Var in the Mediterranean hinterland back of Toulon, from which source of supply comes a large part of the alumina from which aluminum metal is made with great facility since the bauxite mineral often runs 60% pure alumina and not more than 2% silica. The lower grade ore being equally suitable for *ciment-fondu* virtually a new large scale industry has been born. The remarkable thing is that British users, through their affiliations at least, are becoming actually makers in their own right, seeking the mineral where it is to be found and reducing it on the spot. It is thus evident that a great saving in shipping costs is bound to result as compared with shipping the crude ore to reducing plants in England.

Another British enterprise, on even a wider scale, is in embryo in the Department of the Var in France, this plant using high grade ore for producing alumina as well as having an abundant supply of high silica content ore in its own right and near at hand, furthermore actually mining brown coal on the same property thus providing the necessary fuel and power at low cost.

Such facts as these show the preeminence of the idea that aluminous cement is something that has a potentially big future.

The industry and the use of the product is progressing rapidly in France. The product is known under various names—*ciment noir*, *ciment-fondu*, *electro-ciment*, etc.

The Lafarge patent followed more or less precisely upon the lines of the formula laid out by one Jules Bied in the latter quarter of the last century, its virtues lying largely in its quick hardening and long enduring properties.

French comparative figures commonly quoted for *ciment-fondu* and ordinary portland cement are as follows:

	Silica	Alumina	Lime	Iron	Divers	
Portland...........	23	7	64	4	2	— 100
Ciment fondu......	10	42	42	6	..	— 100

Fusion is arrived at at 1400° centigrade in an electric furnace, current consumption running from 1,000 to 1,400 kilowatt hours per ton.

Production is costly as compared with other cements—from raw material costs and high current costs alike. Available hydraulic power is usually counted upon to reduce the latter as is the case of the French plants operating in the High Alps. In the latter case there is a rail haul for the mineral of between three and four hundred miles, another difficulty and high cost in these days of exceedingly high freight rates in France.

The two principal French companies operating in the mountain districts are the La Farge Company at Moustiers in Savoy and the Forces Motrice de l'Agout at Luziere in the Tarn department.

Ciment-fondu is resistant to the crystallization which affects ordinary cements in sea water.

Limestone Production as a Mining Problem

By J. R. Thoenen,

Greenville, Ohio

From a paper presented at the February 1925 meeting of the American Institute of Mining and Metallurgical Engineers, Inc.

If asked whether limestone production is a mining problem I would not hesitate to answer emphatically in the affirmative. The question "When is a quarry a mine?" is familiar. The immediate mental picture induced by the thought of limestone production is that of an open quarry. All are familiar with the open pit in the iron-producing districts of Minnesota and Michigan and the open cuts of the so-called "porphyry" coppers of the West. If these are mines, they differ little from limestone quarries in general mode of operation; if quarries, why do they need the attention of mining engineers?

To the mining engineer interested in production, limestone is important because of its volume, commercial importance and the problems presented by its recovery. Most of the limestone is produced from open quarries, of which there are three types, depending on whether the crushing plant is below, above, or on the same level as the quarry itself.

In the first type, the stone goes to the crusher by gravity by an inclined tramway, or by locomotives and cars. This can be compared to western copper mines and hillside quarries. In the second type are found the greatest number of both limestone quarries and open metal mines. Many limestone quarries are limited in their lateral extension by their location within city limits or other causes. Many metal mines, operating on wide lodes or massive deposits, or like the iron mines of Minnesota and Michigan, also belong to this type. In quarries within city limits, the mining engineer might develop a system of underground mining that will allow for lateral extension. By this means, heavy blasting, the greatest objection to city quarries, would be largely eliminated. Some system of delayed caving over weakened pillars, after exhausting the supply of stone from stopes, would seem to offer possibilities for study. In the third type, with quarry and crusher on the same level, are a smaller number of open quarries as well as open metal mines. The reason is that limestone is exploited principally from horizontal beds and progress is downward as well as lateral. Therefore, quarries started in this way soon become of the second type, because of the lowering of the quarry floor.

In all three types of open quarries, as in open mines, both single-face and multiple-bench methods are used. There are quarries operating in one face 240 ft. high and others 10 ft. high.

Metal mines tend more to the use of several benches of moderate height. Many quarries are now standardizing on benches of 50 ft. vertical height, as being most economical for shovel operations.

Underground mining of limestone is as yet of comparative minor importance. Nevertheless, as shown by my notes and observations of the past year, of the 100,000,000 tons of limestone produced in this country annually, something over 6,000,000 tons come from underground workings. Many cement and lime manufacturers have found it cheaper to mine than to remove overburden. Others find they can get a cleaner stone, and thereby a higher grade product, from the mine than from the quarry. Still others have turned to mining to solve the question of year-round production.

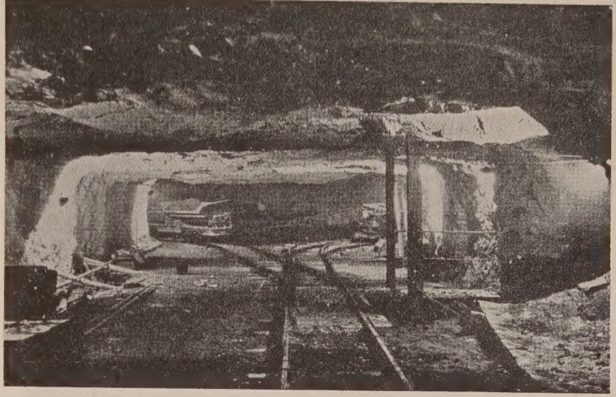
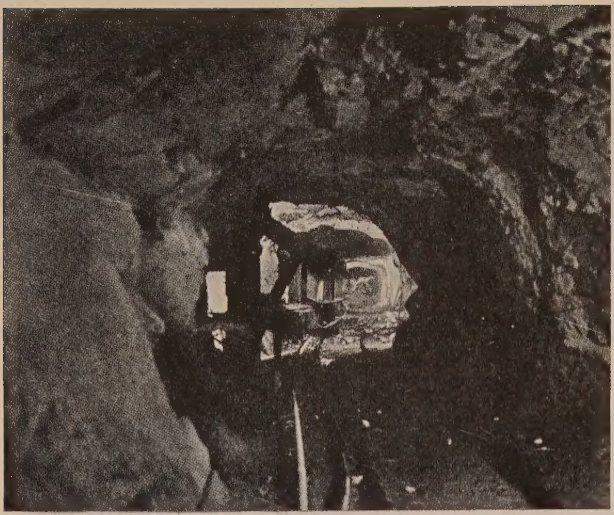


Fig. 1—Mining for Limestone. The American Lime and Stone Company is securing a cleaner product and more continuous operation by substituting mining for quarrying. At this mine there are four cross-cuts driven from the shaft to the limestone deposit, which is 50 ft. thick and dips 52°. The blasted rock from each level is dumped into the inclined raise shown at the right

Methods of mining in use range from unsystematic, irregular breast stopes, through combinations of room-and-pillar mining with underhand and overhead stoping in flat deposits, to elaborate inclined and vertical shafts with back stoping over shrinkage in steeply pitching strata. In one mine limestone is being hoisted from a horizontal bed through a vertical shaft 550 ft. deep, and in another a vertical shaft 350 ft. deep is installed on the vertical side of the open quarry. But, thus far, there are few instances of limestone being mined from shafts. It is generally extracted through tunnels or adits driven into the side of an abandoned quarry or the side of a hill. Here the methods of the metal and coal miner have been added to the quarryman's own ideas.

Room-and-pillar methods are almost universal in the limestone mines. Their applications are about as varied as the number of mines. Room-and-pillar methods are commonly termed tunnel mining, probably because they are usually begun as large tunnels driven from the side of a former open pit. These tunnels are carried from 8 ft. to 18 ft. high in a single breast, and from 12 ft. to 50 ft. wide. Pillars sometimes take the form of ribs, but some are often circular or square in section. Their size depends generally on the judgment of the operator, there being no set rule for proportioning them with respect to the ground removed in the rooms. Long ribs are sometimes used to protect main haulageways with square or round pillars in the rooms. Some operations are driven methodically on surveyed lines, with regular cross entries from room to room, while others apparently have never been seen by a surveyor.

Some tunnel headings are driven along the roof, followed by simultaneous bench stoping behind the drills; others



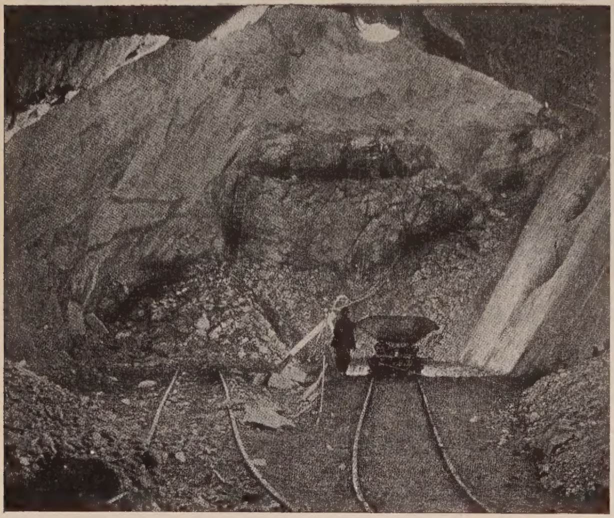


Fig. 2—Chutes from the filled stopes. The filled or shrinkage stope system is employed at Bellefonte, Pennsylvania. The stopes are kept nearly filled with broken stone, upon which the men stand to drill the roof. Rock from the stopes is loaded into cars from the chutes shown in the picture

Fig. 3—An open stope. The original plan of the American Lime and Stone Company was to have large open stopes, 50 ft. wide and 30 ft. high. Because of the danger of working in these high, open places, this plan has been abandoned in favor of filled stopes. The angle of inclination can be plainly seen at the right

reverse the process and carry the tunnel heading on the floor, followed by back stoping. With upper holes in one case both back and bench stoping are following, a tunnel heading in the center of the stratum. In one or two instances a central tunnel is driven the full height of the seam, followed by side holes to widen the room as required. Back stoping by upper holes in a metal mine, where the breaking is done directly over trammers, is not usually considered good practice because of the danger of leaving loose ground above, but in the limestone mine, where the holes can reach a good parting in the strata, this objection does not apply so forcibly. In an Ohio mine, the limestone stratum lies on an 8-in. bed of soft shale. Advantage is taken of this to use a coal cutter to undercut the limestone after which it is blasted like coal. Various combinations of shrinkage stoping with tunnels are also employed where the thickness of strata warrants.

The placing of drill holes in limestone is at least varied as in metal mining. For tunnel driving, drills range from the Jackhamer type held in the operator's hands to heavy piston drills mounted on 8-ft. to 18-ft. columns. With the latter, miners work from the top of portable stages. Tripods are sometimes used to drive headings. At one plant, an ingenious contrivance enables the driller to continue operations without waiting for the shoveler to clean up the face. It consists of a car fitted with a counterweighted boom, operated with a hand winch. On the end of this boom is a steel cage. The driller mounts this cage and with a Jackhamer drills out the whole 30-ft. vertical face by using a bottom cut without lifters, while the muckers clean up the previous blast below him. Wedge cuts, either in the center or at one side of the room, are quite common. Sometimes the ground is broken in triangular blocks; in which case the holes are drilled as in the initial wedge cut, all meeting at the bottom of the wedge.

Few open quarries or mines are free from the expanse of overburden removal. Because of the comparatively higher value of its product, and its greater vertical extent, the metal mine can usually stand a greater cost a ton in this respect. Although smelting and refining charges against the metallic ore add materially to the ultimate unit cost and thus reduce the amount that can be allowed for stripping. Furthermore, the metallurgy of limestone or its calcination to lime or cement, paralleling the smelting of metallic ores, would automatically result in a higher market value for the ultimate product and likewise allow the removal of more overburden. The lime and cement manufacturers are turning to the so-called higher-cost mining methods.

Methods for removing overburden are practically the same, for both metal mines and quarries. Mechanical means, such as the steam, gas or electric-driven shovel, dragline cableway, and clamshell excavators are all in use, as is also pick, shovel, and wheelbarrow work, supplemented by drag scrapers and auto trucks.

The proportion of open metal mines using mechanical shovels for loading cars is greater than in limestone quarries, because they do not require a sized product. In many places where the quarry uses hand methods, mechanical means would not apply as, for instance, the loading of stone for consumption in lime kilns. The kiln requirements for a sized stone prohibits the use of mechanical shovels, unless the cost and operation of screening machinery is less than the extra cost of hand loading and sorting.

Hauling from quarry or open mine to crusher is accomplished by identical means, including inclined tramways, overhead cable-ways, and gas, electric or steam locomotives, with end or side dump cars. Some limestone quarries use the fast rotary-dump cars, similar to those for coal mines.

Whatever opinion may be held respecting limestone quarries in general, there can be no doubt that the underground limestone deposit is a mining problem. But, its problems differ from metal-mine practice in many particulars, and any metal-mine method used in limestone without careful preliminary study of existing conditions may cause serious trouble. Mining engineers have called it folly to think of carrying rooms over 30 ft. wide; on the other hand limestone operators hold there is no danger in rooms 100 ft. wide in limestone. There are instances where both are wrong, and others where both might be right. However, a limestone mine that has had careful technical study and advice invariably shows it on the cost sheet. The American Lime & Stone Co., of Bellefonte, Pa., has one of the few underground limestone mines in this country operating on an inclined stratum, and using a regular backstoping method over shrinkage and loading through chutes. That this company is successful indicates that limestone production is a mining problem.

Limestone mines, like the one at Bellefonte, often produce stone at a lower cost than does the open pit.

The demand for Lumnite cement is increasing very rapidly, it is reported by The Atlas Lumnite Cement Co., 25 Broadway, New York City, and additional equipment is being installed and changes in the plant are constantly being made to keep up with the demand.

Cost Accounting in the Cement Industry

Getting the Essential Figures in Spite of Complications

By O. N. Lindahl[1]

Courtesy *Industrial Management.*

> "There are many things to consider in the accounting problems of a cement mill, such as the handling of the accounts in connection with the cafeteria, lodging houses, privately owned box cars, etc. These properties should in theory at least break even, and possibly earn an amount equivalent to a fair interest on the investment. It is an exception for any of these items to do this; instead, they usually show losses which are a source of worry to the management. However, as they are a necessary requisite to the successful running of a plant, they must be considered in fixing the cost of the finished product.
>
> "Study of this article, and application to the chart, will give a fair understanding of some of the problems of accounting connected with the cement business."—O. N. Lindahl.

So much has been written on cost accounting in the various lines of industry, and much of it duplication, that the writer hesitates to make another contribution. The only excuse for this attempt is that the various fields of endeavor have usually been in other lines than cement and furthermore, as the cement industry is one of the basic industries of the country and as its accounting practices seem to have been overlooked, this article will attempt to put its practices and problems before the public in as simple a manner as possible.

There is a wide-spread feeling on the part of the public at large that the expenditures involved in the manufacture of cement are negligible. Those who have been reading the educational publications put out by the Portland Cement Association for the past year or so, in an endeavor to educate the public to the processes involved in the manufacture of this product, will readily recognize that this is not so, but for the benefit of those who have not read these articles and do not know, the following explanation will reveal the fact that it does cost money to manufacture and market portland cement and that in considerable amounts. In the first place it is an industry that everybody cannot break into unless they have a very large amount of money, because in order to build even a very small plant, say of 600,000 barrels output per year, with its necessary equipment, inventories, etc., will cost at least $3.00 per barrel for a second class plant and about $4.50 per barrel for a first class plant.[2] The money is used for the purpose of quarry lands, mill lands, buildings, machinery, etc. The machinery is used in drying, grinding and pulverizing the heavy gritty materials passing through the machinery for 24 hours every day, with the result that the repairs to such machinery are, compared to other industries, excessive and this makes it necessary to set up in costs heavy rates for depreciation of such equipment.

Probably the reason for the impression that cement costs nothing is due to the low price for which it can be purchased by the consumer. It is a known fact that cement is probably the cheapest manufactured product on the market.

By way of getting across quickly that it costs considerable to manufacture cement, it should be borne in mind that it takes about 600 pounds of raw materials, from 150 to 200 pounds of coal, approximately 18 kilowatt hours of electrical energy and considerable labor to produce one barrel of cement. It takes about one hour of man labor to manufacture approximately two barrels of cement. To the total sum of the above items should be added all the necessary overhead expenditures such as taxes, State, local and federal; depletion, depreciation, repairs, administrative and selling expenses, advertising, tools lubricants, cost of packing and loading cement from the bins into cars, cost of counting, inspecting, sorting and mending returned cloth sacks and many other other smaller items which, in the aggregate, make quite large sums.

The process of manufacture starts with the quarrying of the raw materials used, such as limestone, shale, clay, etc. These quarries are usually located in the proximity of the plant. In some few cases the cement companies do not own their own quarries, which necessitates the purchasing of raw materials, which eliminates the first operation. No cement mill should be built which has not in sight at least twenty-five years' supply of raw materials, either through operating its own quarry, leasing a quarry, or knowing where raw material can be procured at a reasonable cost for this period of time.

There are two methods of producing cement, namely, dry process and wet process. The first, or dry process, is where raw materials are quarried, crushed, dried, pulverized and mixed properly through the various departments of the mill. Needless to say, the burning, grinding, pulverizing and mixing of raw materials is the important part of the manufacture of cement. Both the dry and wet processes are followed when limestone and shale or clay, or limestone and granulated slag are used. The second method, or wet process, is generally employed when marl and clay are used; these materials are taken as they come from the ground and are ground in tube mills, (so-called because of their resemblance to large tubes) together with enough water to make a thick mix or slurry. This process is also used when clay and chalk are used. The slurry consistency is that of mud used in making thin mud pies and is fed by pumps into storage tanks, where it becomes thoroughly mixed. From here it is pumped into the kiln for drying and burning into a clinker.

QUARRYING

As the first steps in the manufacture of cement consist of

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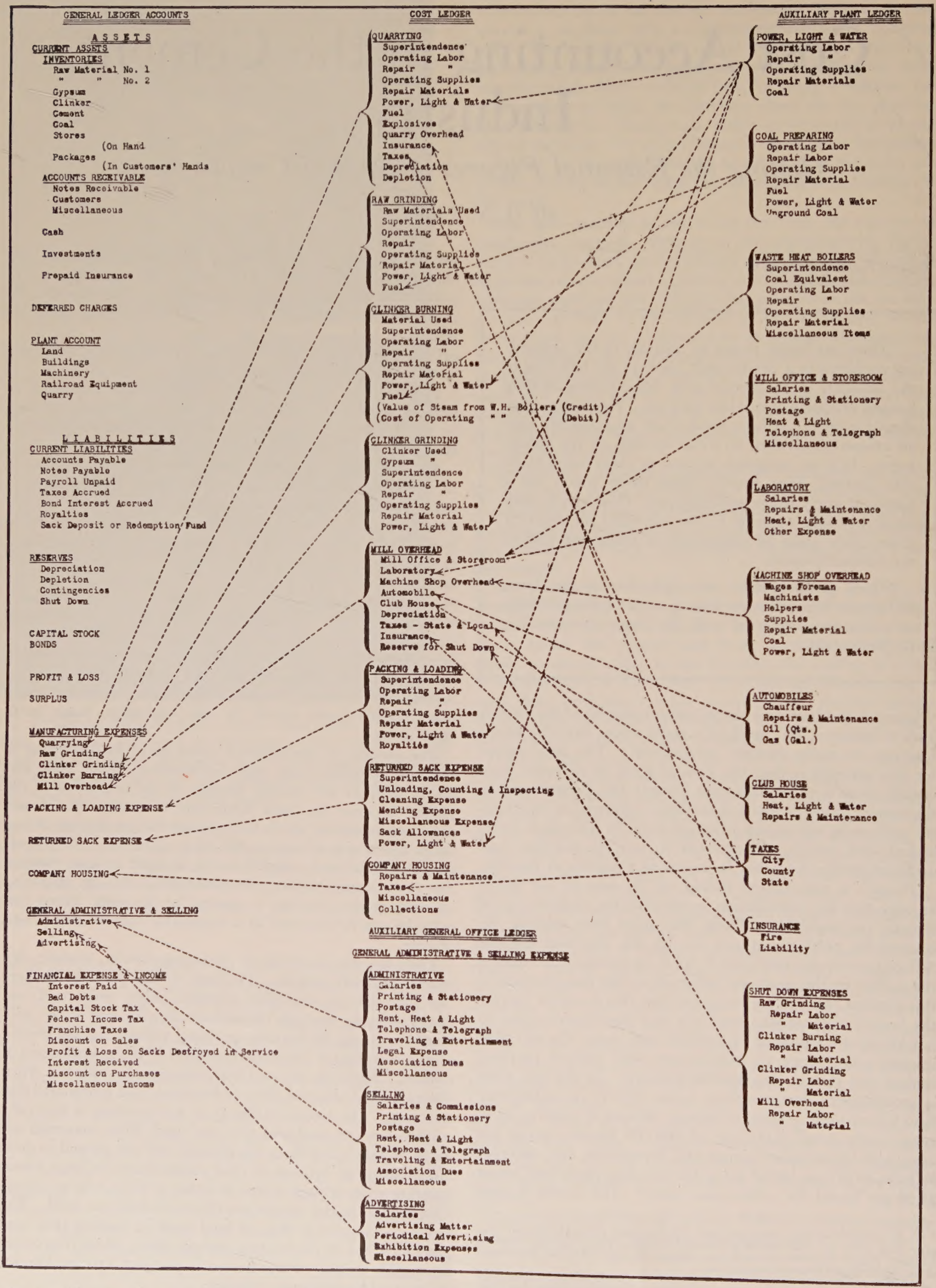
[1] O. N. Lindahl has been associated with the Universal Portland Cement Company since 1910; as Chief Accountant for the first four years, and since then as Auditor. Prior to his association with that company, he was in the Cost Department of the Illinois Steel Company for four years.

In 1919 and 1920 Mr. Lindahl was Preisdent of the Illinois Manufacturers Cost Association, serving on their Executive and Advisory Committees since that time. He has been a member for the past ten years of the Accounting Committee of the Portland Cement Association, and is a member of the National Association of Cost Accountants.

[2] U. S. Department of Agriculture, Bureau of Public Roads, Vol. 3, No. 33, January 1921.



GENERAL LEDGER ACCOUNTS

ASSETS

CURRENT ASSETS
- INVENTORIES
  - Raw Material No. 1
  - " " No. 2
  - Gypsum
  - Clinker
  - Cement
  - Coal
  - Stores
  - Packages (On Hand
  - (In Customers' Hands
- ACCOUNTS RECEIVABLE
  - Notes Receivable
  - Customers
  - Miscellaneous
- Cash
- Investments
- Prepaid Insurance

DEFERRED CHARGES

PLANT ACCOUNT
- Land
- Buildings
- Machinery
- Railroad Equipment
- Quarry

LIABILITIES

CURRENT LIABILITIES
- Accounts Payable
- Notes Payable
- Payroll Unpaid
- Taxes Accrued
- Bond Interest Accrued
- Royalties
- Sack Deposit or Redemption Fund

RESERVES
- Depreciation
- Depletion
- Contingencies
- Shut Down

CAPITAL STOCK

BONDS

PROFIT & LOSS

SURPLUS

MANUFACTURING EXPENSES
- Quarrying
- Raw Grinding
- Clinker Grinding
- Clinker Burning
- Mill Overhead

PACKING & LOADING EXPENSE

RETURNED SACK EXPENSE

COMPANY HOUSING

GENERAL ADMINISTRATIVE & SELLING
- Administrative
- Selling
- Advertising

FINANCIAL EXPENSE & INCOME
- Interest Paid
- Bad Debts
- Capital Stock Tax
- Federal Income Tax
- Franchise Taxes
- Discount on Sales
- Profit & Loss on Sacks Destroyed in Service
- Interest Received
- Discount on Purchases
- Miscellaneous Income

COST LEDGER

QUARRYING
- Superintendence
- Operating Labor
- Repair "
- Operating Supplies
- Repair Materials
- Power, Light & Water
- Fuel
- Explosives
- Quarry Overhead
- Insurance
- Taxes
- Depreciation
- Depletion

RAW GRINDING
- Raw Materials Used
- Superintendence
- Operating Labor
- Repair "
- Operating Supplies
- Repair Material
- Power, Light & Water
- Fuel

CLINKER BURNING
- Material Used
- Superintendence
- Operating Labor
- Repair "
- Operating Supplies
- Repair Material
- Power, Light & Water
- Fuel
- (Value of Steam from W.H. Boilers (Credit)
- (Cost of Operating " " (Debit)

CLINKER GRINDING
- Clinker Used
- Gypsum "
- Superintendence
- Operating Labor
- Repair "
- Operating Supplies
- Repair Material
- Power, Light & Water

MILL OVERHEAD
- Mill Office & Storeroom
- Laboratory
- Machine Shop Overhead
- Automobile
- Club House
- Depreciation
- Taxes - State & Local
- Insurance
- Reserve for Shut Down

PACKING & LOADING
- Superintendence
- Operating Labor
- Repair "
- Operating Supplies
- Repair Material
- Power, Light & Water
- Royalties

RETURNED SACK EXPENSE
- Superintendence
- Unloading, Counting & Inspecting
- Cleaning Expense
- Mending Expense
- Miscellaneous Expense
- Sack Allowances
- Power, Light & Water

COMPANY HOUSING
- Repairs & Maintenance
- Taxes
- Miscellaneous
- Collections

AUXILIARY GENERAL OFFICE LEDGER

GENERAL ADMINISTRATIVE & SELLING EXPENSE

ADMINISTRATIVE
- Salaries
- Printing & Stationery
- Postage
- Rent, Heat & Light
- Telephone & Telegraph
- Traveling & Entertainment
- Legal Expense
- Association Dues
- Miscellaneous

SELLING
- Salaries & Commissions
- Printing & Stationery
- Postage
- Rent, Heat & Light
- Telephone & Telegraph
- Traveling & Entertainment
- Association Dues
- Miscellaneous

ADVERTISING
- Salaries
- Advertising Matter
- Periodical Advertising
- Exhibition Expenses
- Miscellaneous

AUXILIARY PLANT LEDGER

POWER, LIGHT & WATER
- Operating Labor
- Repair "
- Operating Supplies
- Repair Materials
- Coal

COAL PREPARING
- Operating Labor
- Repair Labor
- Operating Supplies
- Repair Material
- Fuel
- Power, Light & Water
- Unground Coal

WASTE HEAT BOILERS
- Superintendence
- Coal Equivalent
- Operating Labor
- Repair "
- Operating Supplies
- Repair Material
- Miscellaneous Items

MILL OFFICE & STOREROOM
- Salaries
- Printing & Stationery
- Postage
- Heat & Light
- Telephone & Telegraph
- Miscellaneous

LABORATORY
- Salaries
- Repairs & Maintenance
- Heat, Light & Water
- Other Expense

MACHINE SHOP OVERHEAD
- Wages Foreman
- Machinists
- Helpers
- Supplies
- Repair Material
- Coal
- Power, Light & Water

AUTOMOBILES
- Chauffeur
- Repairs & Maintenance
- Oil (Qts.)
- Gas (Gal.)

CLUB HOUSE
- Salaries
- Heat, Light & Water
- Repairs & Maintenance

TAXES
- City
- County
- State

INSURANCE
- Fire
- Liability

SHUT DOWN EXPENSES
- Raw Grinding
  - Repair Labor
  - " Material
- Clinker Burning
  - Repair Labor
  - " Material
- Clinker Grinding
  - Repair Labor
  - " Material
- Mill Overhead
  - Repair Labor
  - " Material

A graphic presentation of cost accounting methods in the cement industry quarrying, the accounting for this particular unit necessarily comes first. It is a fact that very seldom is the same amount of raw material quarried as is burned into clinker in any given month, and likewise clinker is burned either in greater or lesser quantities than the raw material quarried in any month, which results in adding to the inventory of raw material or taking away from this inventory if less or more than produced is burned. The whole year's supply of raw material may be quarried in six months and, if such is the case, it should be thrown into inventory at its quarrying cost and used up from inventory at its inventory price, so as to have final cement cost indicative of true operating conditions. Likewise in the case of burning clinker, if more is burned in any one month than is ground, the excess should be placed into inventory and used up at its inventory value when later it is ground up. This gives a correct manufacturing cost throughout the year, if outside influences from one period to another in the year are not too great.

The first operation, as stated before, starts with the quarrying of raw materials and follows through to the final process of finished cement. In order that this may be placed before the reader intelligently, a chart is herewith presented which directs the flow of manufacturing accounts from the distributive accounts to the cost ledger from where they are transferred to the manufacturing accounts in the general ledger. This need not be dwelt upon here because the chart explains better than words can how the processes follow through.

However, it might be well to state here that the general ledger accounts under Manufacturing Expenses of Quarrying, Raw Grinding and Clinker Burning at the end of the month are closed out to Inventory and so carried as partly, or semi-finished product. These accounts are later credited and Clinker Grinding Department is charged, from where it comes out as a finished product of cement and charged to Cement Inventory Account.

It is well to bring out here the methods of arriving at the production of cement for the month. The finished product is weighed by weightometers as it comes out of the tube mills on its way to the bins. The scales upon which the product is weighed are so accurate that the variation between weightometer figures and actual inventory does not vary over one-half of one percent. A good many mills do not have weighing machines and where this is the case, the following method is used to arrive at the production. Cement manufacture is a continuous operation. So many tons of raw material are fed into the operations and so many barrels of semi- or partly-finished and product come out at the other end. At the end of the period the company engineers go out and measure the inventories, taking into consideration the peaks and valleys in the pile. To this inventory is added the shipments for the month, from which the inventory on hand at the beginning of the month is deducted, which gives the production for the month. These figures are further tested by the amount of raw material fed into the raw mills at a known number of barrels of product per revolution of the various feed screws of the tube mills. The pounds of raw material consumed per barrel are then checked against previous productions to see if operating conditions are running uniformly. The foregoing method has been improved considerably of late by the installation of scales which weigh the manufactured product and which obviate the necessity of measurements.

It is necessary, in an article of this kind, that the detail should as much as possible be eliminated, as in all industries the principle is practically the same—the high spots in the operation should be touched upon and explained.

UNUSUAL ITEMS

There are some unusual items which call for an explanation, such as:

(a) Accounting in connection with waste heat boilers.

(b) Packing and loading.

(c) Sack handling, which includes the cost of counting, inspecting, cleaning and repairing empty sacks returned by customers.

(d) Cafeteria accounting and the operation thereof.

(e) Lodging houses.

(f) Shutdown expense.

(g) Accounting for sacks.

The most important of these items are probably the first and the last; the waste heat boilers and the accounting for the difference in price of new sacks shipped between the cost and the billing price. In connection with the accounting for waste heat boilers, there are three ways that this might be done with the same results, they are:

(a) Taking no recognition whatever in the accounts for any by-product but letting the heat from the waste gases fire the boilers and let the energy created by the steam driving the turbines, which generate the electricity, go back into the power costs, with the result that a very cheap power is shown on the cost sheet.

(b) This method takes into consideration that the product of the waste heat boilers is electrical energy, and when this method is used it is necessary to determine the number of kilowatt hours of electrical energy generated during the month, which resultant credit is shown on the Clinker Cost Sheet as electrical energy generated, from which is deducted the cost of operating waste heat boilers, which leaves a net gain from the energy received. In the Power caption on the Clinker Cost Sheet the full amount is charged for power based on the number of kilowatt hours generated. The assumption is that it takes 2.4 pounds[3] of coal per kilowatt hour; this is extended into tons and figured on the basis of coal at the current market price.

(c) Or the third method, which, in the writer's opinion, is more indicative of correct operating results than the two already given, for the reason that it considers steam as the product rather than electrical energy, because that is what is produced to drive the generators. This steam drives the turbines that in turn generate the electricity. In order to arrive at a fair rate per b. hp. for steam, the cost at which steam is or could be produced in a modern steam plant in that particular locality is used as a basis for this cost; this b. hp. rate then should be multiplied by the number of b. hp.'s in the month to get the credit value of steam from waste heat boilers. From this gross credit should be deducted the cost of operating waste heat boilers and which, if deducted from the value of steam, will give the net saving in total money per unit of product in the operation of the waste heat boilers. This results in charging into the Power Costs on the Clinker Cost Sheet, a figure which is approximately what it costs to either purchase power from the outside or generate it in one's own power station.

THE METHOD OF ACCOUNTING FOR WASTE HEAT BOILERS

A great deal of controversy exists as to which of the three methods described should be used in accounting for waste heat boilers. The consensus of opinion in the cement industry is that the "A" method should be used, but the writer believes, from his experience, that the "C" method should be given preference as that reflects more nearly what is actually happening than any other. There is no question whatever, regardless of what anyone says to the contrary, that steam is the product and if that is the case then the accounts should so reflect it. Regardless of which of the three methods suggested is used, the final net results on the Cost Sheet will be practically the same. The only question that presents itself is which of the three methods more truly reflects actual operating conditions and when that is determined, that method should be given preference over the others.

The treatment for handling the accounting in connection with the shipping and returning of the cloth sack has been a troublesome one. It has always been quite a problem, but this problem seems to have at last been solved. To get the right perspective, it should be borne in mind that some cement companies sell their cloth sacks to the customer with the cement for 10c each; while other companies lease the sack to the customer for 10c. In either case, however, the agreement is that they are to be returned to the cement company within a certain specified time, when upon such return the customer will be repaid 10c for each good and repairable sack so returned. With this statement of understanding on the part of the cement company with its customers, the accounting should then be considered. Cement companies at the present time are paying about 20c for each new sack purchased from the manufacturer; these sacks are shipped out to the customer for 10c each. From this transaction it appears on the surface that the cement company has lost 10c for every sack shipped to the customer. This, however, is not a fact because about 90% of the sacks shipped out are returned by the customer and the original deposit of 10c per sack is returned to him. With this in mind, we should consider the accounting procedure. Let us take as an illustration a company leasing its sacks to the customer—for this article assume that the average inventory price for all sacks on hand in the cement company's inventory is 20c per sack and that the charge to the customer is 10c; the following accounts should be opened up in the General Ledger:

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[3] Gerard Swope, President General Electric Co., in an address delivered in 1923

Sack Inventory Account,
Sacks in Customers' Hands,
Customers' Accounts Receivable,
Sack Deposit or Redemption Account,
Profit and Loss on Sacks Developed Useless, and
Profit and Loss on Sacks Destroyed in Service.

All old and new sacks in inventory should be charged to the Sack Inventory Account at an average price, which for this purpose, is 20c per sack. As sacks are shipped, the first entry is a transfer by journal from the Sack Inventory Account to the Sacks in Customers' Hands Account at the average inventory price of 20c per sack. This entry is made solely for the sake of distinguishing the inventory of sacks on hand at the mill from those in the hands of the customer at the end of a period.

At the end of the month (in view of the fact that in the customer's invoice there is a leasing charge of 10c for each sack) in the recapitulation of the Sales Journal the total of the invoice, including the 10c, is charged to the Customers' Sales Ledger Account while the credit is split to Cement Trading Account or, in some cases, to Profit and Loss Account and Customers' Sack Deposit Account. This latter account appears on the Balance Sheet as a distinct liability under Current Liabilities; it is placed there because of its current nature rather than under Reserves.

This Sack Deposit Account stands until the sacks are returned by the customer, when a specific liability to the individual customer should be entered on the books, or check or draft drawn in favor of the customer and charged to the general liability account—Customers' Sack Deposit or Redemption Account. Another entry is then made charging back to Sack Inventory Account and crediting Sacks in Customers' Hands with the number of good and repairable sacks returned at their average inventory value. Auxiliary accounts are kept to show the number of sacks outstanding in the hands of each customer, which (after allowances have been made for those that will not be returned) total should equal that shown by the controlling account—Sacks in Customers' Hands.

THE ITEM OF RETURNED SACKS

There is another item, too, that must be considered at the end of each month and that is the useless sacks which are returned by the customer for which he is not allowed credit; this item should be handled as follows: At the end of the month the Customers' Sack Deposit or Redemption Account should be charged with 10c each for all useless sacks returned and Sacks in Customers' Hands should be credited at the average inventory price of 20c each, and the difference of 10c should be written off to Profit and Loss on Sacks Developed Useless.

Another item to be considered in this sack question is the accounting for the number of sacks which become useless in the hands of customers and are never returned. Cement companies have correct figures on this percentage, each according to its own experience, and ranges all the way from 8% to 15%, but for this purpose we will use a figure of 10%. Ten per cent (10%) of the sacks shipped should, therefore, be written out of the accounts immediately upon shipment. Sack Deposit or Redemption Account should be charged at 10c each for 10% of the sacks shipped, Sacks in Customers' Hands credited with the same number of sacks at an average inventory price, or 20c, and the loss of 10c per sack on this 10% of shipments charged to Profit and Loss on Sacks Destroyed in Service. The foregoing entries are made on the basis of present prices for cement sacks, which are probably in excess of the selling or leasing price. Should the cost of sacks to the cement company be less than 10c per sack, the result will be a reversal of some of the figures.

In the explanation of this cost system it should be borne in mind that there is a distinction between the accounting for shipping and returning cement cloth sacks with that of the actual operation of counting, cleaning, mending and handling these sacks after they are returned to the mill. These operating items at the mill are taken care of in the regular Cost Sheet as shown on the chart. The item of Packing and Loading, which is that of filling cement from bins into cement bags and loaded onto cars, is another expense which the chart shows just how it follows through the accounts.

SHUT-DOWN EXPENSE

Another item worthy of mention is the shut-down expense. In the past this item has been treated as an item chargeable to Shut-Down Expense as it occurred, but a more conservative way, which has been approved by the best minds in the industry, is to set up a reserve at so much per barrel when the mill is running to take care of these shut-down expenses when they actually occur. This is a departure from what has been considered good accounting heretofore, yet the writer feels that in order to be abreast of the times this change is a step in the direction of perfection in accounting.

There are many things to consider in the accounting problems of a cement mill, such as the handling of the accounts in connection with the cafeteria, lodging houses, privately owned box cars, etc. These properties should in theory at least break even and possibly earn an amount equivalent to a fair interest on the investment. It is an exception for any of these items to do this; instead of making money they usually show losses which are a source of worry to the management. However, as they are a necessary requisite to the successful running of a plant, they must be taken into consideration in the fixing of a cost for the finished product; yet, when those unfamiliar with the accounting practice of the cement industry try to arrive at the cost of the finished product, they usually leave these items out of their considerations.

Depreciation is a much misunderstood problem in the cement industry, for the reason that all the facts in connection with it are not known. To get the right perspective on this important item, one should always have in mind:

(a) The cement business is one of continuous operation, twenty-four (24) hours a day and 365 days a year.

(b) Machinery is of an unusually heavy type, with large electrical units, requiring a heavy investment.

(c) Heavy gritty raw materials pass through this machinery causing it to wear out rapidly.

(d) Resolves itself into the fact that the cement business is one requiring a heavy rate for depreciation to offset this wear and tear by continuous operation on high priced equipment by material that wears it out rapidly. This fact is usually overlooked.

There is one particular point in connection with the auditing of the cement business that requires special and careful attention and that is that care should be taken that the production and inventories are as stated by the Engineering or Production Department at the end of any period. Sometimes, in order to make a showing for production, the Engineers in charge will estimate more than what was actually produced, which will result in a low cost; the next month, however, there is developed a shortage which results in a high cost for that month. One of the most important duties of an Auditor in the cement business is to see that these reports are right. Great care should be used and tests taken from time to time to get an idea as to what the feed screws are doing per revolution and that the raw material used is running true to past performances. This applies only to companies who have not yet installed weighing machinery for the recording of the finished product as it comes out of the tube mills and goes into the bins.

As in other industries, a great deal of care should be taken to see that expenditures are properly applied, those applicable to capital, those to up-keep and other accounts charged correctly. There is a great danger in misapplying some of these expenditures if one is not very careful.

Study of this article, and application to the chart, will give a fair understanding of some of the accounting problems connected with the cement business. No attempt has been made to show in detail how the various Journal Vouchers and forms are made up and handled, because the writer thinks that is elemental and for the beginner and need not be discussed in an article of this kind.

Titan Ore Prices and Titan Products

In order to assure proper supplies of titaniferous iron ores for either experimental or commercial work in connection with the Titan cement process, Edwin C. Eckel has leased several mining properties in New Jersey and elsewhere. From these titan ore can now be supplied promptly and of satisfactory grade.

The ore grades now available range as follows:

	Metallic iron	Vanadium oxide	Titanic oxide	Silica	Alumina
Grade No. 1	50%	0.35%	14%	5%	9%
2	50%	0.30%	10%	5%	5%
3	60%	0.20%	6%	1%	1%

The mines now controlled have some 5,000 tons of ore in stock-piles and dumps, grading about as a grade No. 2. This immediate tonnage can be drawn on at 24 hours notice to fill orders for either carload or laboratory lots. It is estimated that an unmined reserve of some 300,000 tons exists on the properties.

Quotations on ore for experimental purposes are now as follows:

In carload lots, $10.00 per gross ton, f. o. b. High Bridge, N. J. (Jersey Central) or Clinton, N. J. (Lehigh Valley R. R.); with right to substitute equivalent mine points.

In laboratory lots, $5.00 per hundred pounds or less, boxed or sacked, f. o. b. above or other mine points in Middle States.

Quotations on grades No. 1 and No. 3, for actual plant use, will be made as occasioned by actual plant development.

It may be added that for some time past Titan compounds of various compositions have been made in the United States from New Jersey and other ores. It has been proved that the characteristic Titan features—the deep and even color, the high specific gravity, and the remarkable chemical resistance, —are retained even in the presence of high silica and alumina. This makes it possible to prepare and ship low-limed Titan bases to areas where the absence of Titan ores and of coke suggest the addition of such a Titan base to a normal cement mixture for rotary kiln or furnace use. Titan bases of the following wide range in composition have been made both in electric and small blast furnaces at temperatures of 1300° to 1350° without difficulty:

Titanium oxide	44%	44%	38%	37%	41%	39%
Silica	1%	23%	16%	5%	22%	5%
Alumina	10%	19%	19%	13%	16%	17%
Lime, magnesia, FeO	46%	5%	30%	46%	23%	44%

Some of these compounds are of course Titan cements in themselves, but the range of burnings is quoted to show what a wide choice is permitted in selection of a proper base for addition to a cement mix.

Samples of any one of these bases, treated by exposure—along with a portland or alumina-cement clinker—to boiling sulfuric acid, hot caustic alkali, or any other re-agent the chemist may have in mind, will demonstrate the infinitely superior chemical resistance of the titanates to either silicates or aluminates.

No Accident Record at Dixie Plant

The employees of the Dixie Portland Cement Co. met the company's challenge that they could not run the plant without any kind of an accident involving loss of time, one hour or more, for three months and at the end of the period, a great Safety First celebration was staged including a barbecue and ball game and visit to the new $200,000 memorial school building under construction which is being built at the sole expense of the company as a memorial to all its men who served in the World War.

The celebration was held at Richard City, and there were separate gatherings of the white and colored employees, respectively, addressed by Dixie officers and others, about the splendid record made and urging continuance of the good work.

In reality, the affair was in celebration of more than just three months of complete freedom from accidents, as the accomplishment of the organization in this respect covers 5 months. Within 5 years, one annual toll of time losing accidents numbered more than 800. Last year, it boiled down to about 100 and this year everybody is out after what will be, if accomplished, the remarkable record of no accidents in 12 months.

President Hardy of the Dixie Portland Cement Co., who is also Mayor Hardy of Chattanooga, Superintendent Klein, Director Cotcher of Chattanooga Safety Council and Commissioner-Manufacturer Herron were on the programs of the safety meetings.

Superintendent Klein presided at the safety first meetings each of which was preceded by a parade of employees in two groups, there appearing at intervals banners carrying messages significant of the safety work and challenges between the two groups, Limerocks and Clinkers, into which the operatives are divided in the contest. It was pointed out by director Cotcher that the three necessary elements to prevention of accidents in an industry are to have the plant mechanically safe, the company in the right attitude toward its men and the men in the right attitude toward the company. With all three existing as at the Dixie plant, he said, it was not strange that success had been obtained as in recent months and no reason why it should not be kept up during the entire year.

President Hardy expressed appreciation for the fine cooperation extended by the men in the safety effort and said that freedom from accidents is not a desideratum merely in interest of the company but the employees as well and primarily of the wives and children. He explained that in the old days when somebody got killed, the company was genuinely stricken, because in addition to the loss of the man, there was the question of the future of the wife and children. He emphasized that the company does not feel that it is "stuck" by giving a barbecue after every 3 months freedom from accidents but welcomes the opportunity and was willing to repeat every 3 months if the record was sustained.

The plan of the Portland Cement Association was referred to under which a very valuable trophy is awarded yearly to the plant having the best no-accident record and had paid two men from the mill to attend the Spring convention and receive the trophy. The Dixie company, he said, would match anything the Association does in safety first work, so it will send another two men to the convention if the Dixie company captures the trophy this year.

A special song was sung entitled "Old Accidents Goodbye." The singers making a distinct hit. Preparations had been made for fully 1000 people and the appearances before all were provided for bore out the estimate.

Cement in March 1925

The following tables, prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on the reports of producers of portland cement. The March, 1925, totals include estimates for two plants. March production exceeds that for all corresponding months; shipments for March were exceeded slightly in the corresponding month in 1923, and stocks were the highest ever recorded.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS IN MARCH 1924 AND 1925, AND STOCKS IN FEBRUARY 1925, IN THOUSANDS OF BARRELS

Commercial District	Production March		Shipments March		Stocks at end of March		Stocks end of Feb.
	1924	1925	1924	1925	1924	1925	1925(*a*)
Eastern Pa., N.J. & Md.	3,087	3,054	2,425	2,758	4,729	5,042	4,746
New York	460	484	272*	445	1,258	1,272	1,233
Ohio, Western Pa. & W. Va.	863	816	661	776	1,936	2,017	1,977
Michigan	510	566	429	428	952	1,299	1,161
Wis.(*b*), Ill., Ind. & Ky.	1,438	1,406	1,264	1,214	2,954	3,739	3,547
Va., Tenn., Ala. & Ga.	837	1,064	799	1,048	797	706	689
Eastern Mo., Ia., Minn. & S. Dak(*c*)	872	887	952	864	2,788	3,271	3,248
Western Mo., Neb., Kan. & Okla	618	867	580	803	1,265	1,562	1,498
Texas	346	422	351	422	396	342	343
Colo. & Utah	104	101	122	168	211	304	372
Calif.	978	1,128	908	1,082	370	514	468
Ore., Wash., & Mont.	257	239	232	271	533	376	407
	10,370	11,034	8,995	10,279	18,189	20,444	19,689

(*a*) Revised. (*b*) Began producing and shipping June, 1924. (*c*) Began producing December, 1924, and shipping January, 1925.

Stocks of clinker, or unground cement, at the mills at the end of March, 1925 amounted to about 9,969,000 bbls. compared with 8,497,000 bbls. (revised) at the beginning of the month.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLANT CEMENT, BY MONTHS IN 1924 AND 1925, IN THOUSANDS OF BARRELS

Month	Production		Shipments		Stocks at End of Month	
	1924	1925	1924	1925	1924	1925
January	8,788	(*a*)8,856	5,210	(*a*)5,162	14,155	17,656
February	8,588	8,255	5,933	6,015	16,815	(*a*)19,689
March	10,370	11,034	8,995	10,279	18,189	20,444
1st quarter	27,746	28,145	20,138	21,456	....	....
April	11,726	....	12,771	....	17,159	....
May	13,777	....	14,551	....	16,403	....
June	13,538	....	15,036	....	14,903	....
2nd quarter	39,041	....	42,358	....	....	....
July	14,029	.. ....	16,614	....	12,319	....
August	15,128	....	16,855	....	10,666	....
September	14,519	....	16,827	....	8,404	....
3rd quarter	43,676	....	50,296	....	....	....
October	14,820	....	17,160	....	6,073	....
November	13,141	....	10,289	....	8,928	....
December	10,435	....	5,506	....	13,913	....
4th quarter	38,396	....	32,955	....	....	....
	148,859	....	145,747	....	....	....

(*a*) Revised.

IMPORTS AND EXPORTS

The imports of hydraulic cement in February, 1925, amounted to 119,077 bbls., valued at $206,308, compared with 162,930 bbls., valued at $219,588 in February, 1924 (*a*). The total imports in 1914 amounted to 2,010,936 bbls., valued at $3,116,564.

The imports in February were from Belgium, 75,677 bbls.; Denmark, 31,700 bbls.; Norway, 11,253 bbls.; France, 244 bbls.; Canada, 203 bbls.

The imports were received in the following districts: Porto Rico, 26,470 bbls.; Florida, 25,390 bbls.; Los Angeles, 24,509 bbls.; Massachusetts, 9,395 bbls.; Oregon, 9,258 bbls.; Washington, 8,947 bbls.; San Francisco, 7,995 bbls.; New York, 5,760 bbls.; other districts, 1,353 bbls.

The exports of hydraulic cement in February, 1925, were 56,249 bbls., valued at $181,356 of which there was sent to SouthAmerica, 19,288 bbls.; Cuba, 13,147 bbls.; to the other West Indies, 878 bbls.; Mexico, 11,643 bbls.; Central America, 7,513 bbls.; Canada, 406 bbls.; and to other countries, 3,374 bbls. These exports are exclusive of shipments to the following possessions: Porto Rico, 6,402 bbls.; Hawaii, 770 bbls.; Alaska, 69 bbls.

The statistics of imports and exports of hydraulic cement in March, 1925, are not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1924 AND 1925 IN BARRELS (*a*)

Months	Imports		Exports	
	1924	1925	1924	1925
January	153,839	229,838	88,586	71,596
February	162,930	119,077	62,606	56,249
March	160,517	(*b*)	91,224	(*b*)
April	148,137	......	83,200	......
May	161,304	......	88,850	......
June	196,655	......	74,064	......
July	108,944	......	60,139	......
August	192,634	......	85,883	......
September	138,369	......	69,470	......
October	214,987	......	79,180	......
November	198,806	......	42,490	......
December	173,814	......	52,851	......
	2,010,936	......	878,543	......

(*a*) Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision. (*b*) Imports and exports in March, 1925, not available.

ESTIMATES OF PRODUCTION, SHIPMENTS AND STOCKS IN THOUSANDS OF BARRELS, AND VALUE OF FINISHED PORTLAND CEMENT IN 1924, BY STATES

(Subject to revision).

State	Active Plants	Production Barrels	Shipments		Stocks Dec. 31 Barrels
			Barrels	Value	
Alabama	5	5,541	5,543	$9,091,000	146
California	10	11,615	11,502	25,649,000	470
Illinois	4	7,005	6,956	12,243,000	691
Iowa	5	5,624	4,882	8,983,000	1,695
Kansas	7	5,894	5,817	10,122,000	867
Michigan	15	9,162	8,993	16,367,000	966
Missouri	5	7,900	7,710	13,801,000	921
New York	9	7,547	7,450	13,708,000	783
Ohio	7	4.599	4,298	7,865,000	657
Pennsylvania	22	40,468	39,847	69,993,000	2,705
Texas	5	4,566	4,488	8,482,000	356
Washington	4	1,845	1,793	4.339,000	290
Other States (*a*)	34	37,093	36,468	66,676,000	3,366
	132	148,859	145,747	267,319,000	13,913

(*a*) Including Colorado, Georgia, Indiana, Kentucky, Maryland, Minnesota Montana, Nebraska, New Jersey, Oklahoma, Oregon, South Dakota, Tennessee Utah, Virginia, West Virginia, and Wisconsin.

ESTIMATES OF PRODUCTION, SHIPMENTS AND STOCK IN THOUSANDS OF BARRELS AND VALUE OF FINISHED PORTLAND CEMENT IB 1924, BY DISTRICTS

(Subject to revision)

Commercial District	Active Plants	Production Barrels	Shimpents		Stocks Dec. 31, Barrels
			Barrels	Value	
Eastern Pa., N. J., & Md.	22	38,281	37,630	$65,809,000	2,488
New York	9	7,547	7,450	13,708,000	783
Ohio, Western Pa. & West Va.	12	14,322	14,030	25,535,000	1,370
Michigan	15	9,162	8,993	16,367,000	966
Wis. (*b*), Ill., Ind. & Ky.	11	21,856	21,355	38,012,000	2,040
Va., Tenn., Ala. & Ga.	12	11,347	11,375	19,224,000	469
Eastern Mo., Ia., Minn., & South Dak.(*c*)	11	14,851	13,982	25,307,000	2,737
Western Mo., Neb., Kan. & Okla	11	9,912	9,595	16,887,000	1,482
Texas	5	4,566	4,488	8.482,000	356
Colo. & Utah	5	2,425	2,378	5,065,000	316
Calif.	10	11,615	11,502	25,649,000	470
Ore., Wash. & Mont	9	2,975	2,969	7,274,000	436
	132	148,859	145,747	267,319,000	13,913

(*b*) Began producing and shipping June, 1924. (*c*) Began producing December, 1924

MASONRY, NATURAL, AND PUZZOLAN CEMENT SHIPPED, 1923, AND 1924

State	1923			1924		
	Producing Plants	Barrels	Value	Producing Plants	Barrels	Value
Alabama(*a*)	1	684,563	$1,137,585	1	745,369	$1,147,088
Illinois	1			1		
Indiana	1			1		
Kansas	1	587,111	809,767	1	673,092	859,471
Kentucky	1			1		
Minnesota	2			2		
New York	1			1		
Ohio	1			1		
Pennsylvania	1			1		
	10	1,271,674	1,947,352	10	1,418,461	2,006,559

(*a*) Puzzolan only.

Tariff Needed By Southeast

A Letter from H. J. Weeks

SECRETARY, SIGNAL MOUNTAIN PORTLAND CEMENT CO.

I have been vitally interested in the matter of a tariff for some time. As you know, the Secretary of the Treasury recently found against the cement manufacturers' contention that cement was being "dumped" in American ports by foreign manufacturers. Regardless of whether there is a technical "dumping" or not, the situation is grave indeed, so far as the southeastern part of the United States is concerned especially.

You are probably familiar with the fact that no mill located in this territory is closer to the ports than approximately 200 miles, and the major consumption of the territory is in the seaboard country. The average minimum freight rate on a barrel of cement from any mill in the South to any port in the South is not less than 50c. Published and quoted freight rates on cement in bags from Baltic ports including Belgium, Denmark, Norway and Sweden are $3.00 to $3.50 per net ton. This includes loading and unloading from the boat to docks. It enables the importers to place cement in their warehouses on deep water alongside of railroad cars at prices which are considerably lower than any cement manufacturer in the United States could possibly compete with.

The unfair part of this is that it is a well known fact that importers pay freights which do not equal the quoted rates on the commodity. A large percentage of the Trans-Atlantic steamships calling at South Atlantic and Gulf ports arrive in ballast for the purpose of carrying cotton back to Europe. It is necessary that these boats have ballast additional to their water ballast. Cement offers an excellent means of furnishing this ballast. If the shipping company can get even the cost of loading and unloading from the shipper, he is making a decided profit on the trancastion for it would cost him not less than $1.00 to $1.50 to load a ballast such as sand or other weighty materials used for that purpose.

We note that cement is being quoted by foreign mills delivered in our ports at prices which approximate the prices received for that commodity at the mills of the American manufacturer many miles in the interior.

Rail rates are always higher than water rates, and when this is combined with the attempt of various local State Utilities Commissions to give preferential inter-state rates from ports to points within their State, the American manufacturer is put at an unfair disadvantage.

The idea of protection in America has always been one of placing a tariff on a commodity equal to the difference in the labor cost in foreign countries and our own. One can deny that the labor cost on producing a barrel of cement in Europe, and particularly in Belgium, is not to be compared with the cost here. This item is a substantial one, representing in some cases a third of the bin cost of the production of cement in America. As the cost of labor in Europe is less than a quarter of the same thing here, it is quite evident that the theory of protection is not being carried out. A duty representing this difference in labor cost would prove conclusively that American mills can compete with foreign mills in our seaboard cities.

Bear in mind that men do not control alone the location of a cement plant. Where nature has deposited materials from which cement is made, man has naturally shown his desire to cooperate by building a plant at that point.

It is not within the province of the cement manufacturer in the United States to locate cement mills where every law of economics would be violated. They have gone as far as it is possible in utilizing the resources of nature in conjunction with the transportation and consumption problem that exists in our country.

I am not deaf to the many aspersions that have been cast on the cement industry in the United States by the demagogue and ignorant writer, but the history of this industry demonstrates conclusively that it is alive to every opportunity.

The enormous growth of the past 20 years and the fact that today it competes with every known building material, shows that no undue and protected profits can be made. Every advance made in the manufacturer of cement in the past 20 years has been of American origin. Enormous investments have been placed in this industry by the American public generally.

The cost of producing a barrel of cement must carry with it the enormous depreciation in costly machinery and natural resources. Unless one is a "Dyed in the Wool Free Trader" it is not difficult for him to see that this industry as far as the seaboard cities are concerned must have a favorable Governmental interest.

I hope that these few thoughts that I have given you will represent an attempt worthy of the consideration of your readers. It is a matter of grave importance to the entire industry, for it becomes an impossible situation to the manufacturers who expect, and rightfully so, to distribute their product along the seaboard. If they cannot do that, they must necessarily turn their attention to the territory of the interior which is now properly supplied by other mills. This is not pleasant to contemplate and will involve all of the industry in the unfortunate situation now existing along the seaboard.

Hudson Valley Plant to Operate Again

Residents of Catskill, N. Y., have expressed considerable satisfaction with the purchase of the property of the Hudson Valley Portland Cement Corp. at Alsen, N. Y., by the Lehigh Portland Cement Co. It is expected that the opening of this plant will give employment to a number of men and thus benefit the surrounding locality.

While no definite statement has been made as to what action the Lehigh company will take, it is expected by residents in the vicinity of the Hudson Valley plant that the plant will be rehabilitated and put into operation at an early date. It is expected that the Lehigh interests will make the plant one of the largest and most important of its kind in the United States. Although there is some speculation in that locality as to whether or not the old plant will eventually be demolished and a new one erected, it is anticipated that the capacity will be increased and the most modern machinery installed.

The Hudson Valley Corp. went into the hands of a receiver several months ago and the plant has been idle for some time. The property was sold at public auction in Catskill, by Earl B. Barnes, special master and was bid in by a New York attorney at $500,000, the bid being assigned to the Lehigh Portland Cement Co. The sale of the property was consummated in March and it was expected that the deed covering the property would be filed at the county clerk's office in Catskill early in April.

Foreign Fer-Al Patent Rights Sold

Applications for the Fer-Al patents have been filed in various countries in the two Americas as well as in Europe. In fifteen of these countries, mostly in Latin America, the rights have already been sold and transferred to the purchasers. Edwin C. Eckel still retains personally, as of May 5th, sole control of the Fer-Al patents in the United States, Canada, Great Britain and Germany, and a few less important countries.

Dixie Company Rebuilds Grinding Plant

The Dixie Portland Cement Co. of Chattanooga is now completing the rebuilding of its raw grinding department.

In that program, it has departed from the usual procedure in rebuilding an old plant, in that it has made no attempt to remodel the old buildings and equipment. Instead, it built alongside the old buildings entirely new structures. It was, therefore, not hampered by the limitations of its old building or by the need of modifying the design so as not to interfere with the operation of old equipment. The company was thus enabled to arrange the new machinery in such a way as to get the maximum of economy and convenience in its operation.

Equipment used in this job represents in itself the latest development in cement mill machinery. It is capable of grinding in 24 hours 2000 tons of rock and shale to a fineness of 90% through a 200 mesh sieve. The power required in this operation is 1600 h. p.

The output of this new raw mill represents an increase of nearly 50% over the old equipment and the simplicity of its operation has resulted in a greatly increased economy of operation. One of the most important results has been in the greater ease with which the company now controls the quality and uniformity of its product.

In its building program, the company has made working conditions for its men pleasant, safe and comfortable.

Action Against Acme Company

In relation to the matter of the application for a receivership for the Acme Cement Corp., instituted by Charles H. Breerwood, former president of the corporation, a statement attributed to Luther G. McConnell, treasurer of the company appeared in a recent issue of the *Catskill Daily Mail* stating that the action filed against the Acme Cement Corp. is a controversy affecting only the rights of stockholders. It is pointed out that the financial condition is not attacked by Mr. Breerwood and both the president and treasurer of the company state that the company's present financial condition is the best in its history.

It is stated that production has increased from 300,000 bbls. in 1922 to 700,000 bbls. in 1924 and that during the year 1925, the company will manufacture and ship close to 1,000,000 bbls. of Acme portland cement. Many improvements have been made in the plant and for the first time in its history the plant has operated throughout the entire winter, being the only company on the Hudson river operating throughout the winter 1924-25.

The preliminary hearing of the receivership proceedings was scheduled for April 14, and a hearing on Mr. Breerwood's petition for the appointment of one or more receivers for the company was to be held some time after the April 14 hearing.

It is reported that pending the preliminary hearing, a number of individual defendants were temporarily restrained from selling, assigning or transferring any of the shares of stock issued to them by the corporation.

Museum Gets Copy of Cement Patent

A photographic copy of the portland cement patent granted to Joseph Aspdin, by King George the Fourth, of England, October 21, 1824, has been presented to the Smithsonian Institute by the Portland Cement Association.

This copy was made from the original still held by descendents of Aspdin and was brought to this country by Sir Edwin Airey, former lord mayor of Leeds, the home of Aspdin, during Sir Edwin's visit to America last fall.

A similar copy was presented to the University of the State of New York at Albany by Sir Edwin Airey, when he visited Albany last December. This reproduction now hangs in the State Museum.

Another facsimile is in the possession of the Portland Cement Association and is at present hanging on the wall of the general office in Chicago.

National Lime Association Convention

Some of the speakers who will address the lime manufacturers at the Seventh Annual Convention of the National Lime Association to be held on May 26-29 at Briarcliff Lodge, Briarcliff Manor, Westchester Co., New York, are: C. P. Hoover who will talk on "The Use of Lime in Water Purification and Softening"; Dean E. J. McCaustland, of the Engineering Department, University of Missouri, who will speak on "Lime in Dirt Roads"; Prof. R. T. Haslam, and Prof. Prevost Hubbard, Chemical Engineer of the Asphalt Association, whose subjects have not yet been announced.

Utah Company Adopts Wet Process

Improvements calling for an expenditure of $200,000 have been started by the Portland Cement Co. of Utah in changing from the dry to the wet process of cement production. The changes and improvements to be made will result in increasing the mill's output 25 to 30%, and when completed this plant, which is located in Salt Lake City, will rank among the most modern in the west.

The enlargement of the plant is being made in anticipation of increased demand for cement which is expected in the territory it serves in 1925 and in the future, according to officials of the company.

The adoption of the wet process of production involves the enlargement of the rotary kilns from 8 to 10 ft. in diameter and 125 ft. in length as used in the dry process, to 10 ft. in diameter and 185 ft. long for the wet process. It also involves the installation of a new style of grinding machinery. Enlargement of the kiln is necessary in order to take care of the evaporation of the water in the slurry. Other advantages expected under the wet system are the elimination of dust and the assurance of a more reliable output, according to the management.

It is expected that the improvements will be completed and the new system put into operation by May 11.

An interesting feature of the alterations now under way is the work of the Intermountain Gunite & Construction Co. in converting 10 dust chambers of brick construction into slurry storage tanks.

The tanks are eliptical in shape with diameters of 16 and 10 ft. and a depth of 31½ ft., capable of holding material weighing 100 lbs. per cubic ft. These tanks are being reinforced by the construction company with square steel mesh and built up with mortar, shot on with cement guns at 40 to 50 lbs. pressure to a thickness of 8 in. at the bottom and 4 in. at the top.

The Brazilian Portland Cement Co. is building the first cement mill in that country. This plant, which is located about 12 miles from Sao Paulo, will have a capacity of 1,000 barrels per day and will be completely electrified.

General Electric equipment has been ordered for the plant, including one 200-h. p. and two 500-h. p. synchronous motors; three 500-kv-a, 44,000/2300-volt transformers; switchboard and substation switching equipment; two 50-kw. motor generators and 24 motors ranging in size from 10 to 100 h. p.

Warning Against Untested Cement

Because of the uncertain quality and condition of the foreign-made portland cement that is being shipped into the local market, city building superintendent Robert L. Proctor, Seattle, Wash., has issued an open letter to the building public warning against untested cement, according to the *Seattle Times*.

Cement made in the United States, having been constantly under test for 15 years, has the indorsement of the building department, but Superintendent Proctor stated that the last shipment of foreign cement was of such questionable nature, and in so many different forms of containers not complying with the building code that his office finds it difficult to make inspections.

In his open letter Mr. Proctor says:

> The building code requirements provide that all cement used in building construction shall conform to the specifications for physical and chemical properties of portland cement as established by the American Society for Testing Materials. There are only four brands of cement on the Seattle market today which have been established as complying with these requirements.
>
> While reluctant to embarrass dealers in cements which have not been established as complying with city standards, I feel that users of cement should be advised of the conditions surrounding so-called unapproved cements. There are cements in Seattle today which have not been established as complying with the above standards. These, no doubt, will be offered for sale and users will do well to advise themselves regarding the quality before purchasing.

Indicating that much of this foreign cement is reconditioned in an effort to meet requirements of the Seattle market, it is stated that kernels of wheat, in many instances, have been swept up with the cement and this wheat has swollen after the cement has set—appearing as blisters in sidewalks, laundry trays, and other cement work.

In order to insure safety to the users of portland cement, the Seattle building code requires that all cement be delivered in original, unbroken packages, plainly marked by the manufacturer, with brand, name and place of manufacture distinctly printed thereon.

The last shipment of foreign cement consisted of several thousand barrels, in at least 15 different kinds of containers.

Foreign Cement Production Facts

By E. Lee Heidenreich

The following report on a number of foreign cement industries is abstracted from the *Tonindustrie-Zeitung*, of March 7, 1925.

Norway—Production was greater than ever and while the local consumption was shorter, exports covered the production.

England—For a change, England sent Belgium 200,000 bbls. of cement and at the price of 43s. 3d. per ton. On the whole, Great Britain exported 651,220 tons in 1924.

Checko-Slovakia—has 12 factories for making artificial cement and the production of 1,000,000 tons annually.

Austria—The year 1924 was unfavorable for the cement industry. The greatest consumption was for the water-works improvements.

Russia—The greatest Russian cement factory is located at Katan-Ivanow, and is at present being greatly enlarged.

Greece—The two principal factories of Greece are located in Athens, and the third one is going to be opened this year in Volo and the production is largely for export.

Japan—The main cement industries of Japan are located in Osaka, in which 20 companies with 31 factories are located with a capacity of about 30,000,000 bbls. annually.

Roumania—The year 1924 was subject to Rumania's poor money exchange which brought the cement industry down to a hitherto unknown basis. The factories in Rumania today have the most modern rotary kilns and are in a position to meet European conditions in the future.

In Braila, the two rotary kilns are 140 ft. long. In Cernavoda there are two rotary kilns 105 ft. long. In Fieni Dambovita is one kiln 125 ft. long. In Azuga, one kiln is 125 ft. long. In Titan in Bukarest, there are two kilns 115 ft. long. Azuga has one, 115 ft. long, Bibescu, in Comarnic, has one 94 ft. long. Ssori in Gura Vali has one 80 ft. long. All are in old Rumania.

In New Rumania, the factory in Turda has 2 rotary kilns 115 ft. long.

Kugler & Co., Brasow, has 10 Dietsch-Ovens.

The Putna factories have 6 Dietsch-Ovens.

Gura Honti, near Arad, has several Dietsch-Ovens.

In all these factories, the fuel used is natural gas, largely from Sarmaschel. A cubic meter of this gas gives 8500 calories and contains from 98-99% methan.

Some of the new Rumanian factories use coal, however, but the main out-put of Rumania is produced by natural gas.

Bauxite in the United States in 1924

The production of bauxite in the United States in 1924 was 346,553 long tons, valued at $2,131,908, a decrease of 34% in quantity and 32% in value as compared with the domestic production in 1923, according to a statement issued by the Department of the Interior, prepared by James M. Hill, of the Geological Survey.

BAUXITE PRODUCED IN THE UNITED STATES IN 1923 AND 1924, IN LONG TONS

Year	Domestic Production	Imports	Exports[1]
1923 1924	522,690 346,553	119,020 201,974	78,560 77,065

[1] Largely bauxite concentrates.

DOMESTIC BAUXITE SOLD BY PRODUCERS TO INDUSTRIES IN 1923 AND 1924, IN LONG TONS

Year	Aluminum	Chemicals	Abrasives, Refractories, and Cement	Total
1923 1924	380,520 225,774	68,870 53,859	73,300 66,920	522,690 346,553

The production of bauxite in the Arkansas field was 326,616 long tons in 1924, a decrease of 167,264 tons as compared with 1923. The eastern field decreased its output over 8,000 tons, the production in 1924 being 19,937 tons from Georgia and Tennessee. No bauxite was produced in Alabama in 1924. The imports of bauxite in 1924 were 201,974 tons, an increase of about 70% as compared with 1923, most of which came from the Guianas, South America, though some French and Dalmatian bauxite was received.

The Pacific Portland Cement Co., consolidated, which has hitherto been without bonded indebtedness has planned an issue of $2,000,000 face value, short time notes, part of which, it is stated by the *San Francisco Examiner*, will be used to take up notes given in part payment for the recently acquired gypsum property in the Imperial Valley.

It is reported that the estimated outlay of $5,500,000 for a new plaster mill at Gerlach, Nev., and the new cement mill at Redwood City, was found to be somewhat below the final cost, chiefly because of the more substantial and extensive character of the construction work that was originally deemed necessary. Also the directors of the company feel that a substantial working cash balance must be provided to meet the requirements engendered by the corporation's heavily increasing business.

Men and Mills

Notes from the Field

The Linwood Cement Co., Davenport, Ia., has about completed foundation work for its new cement mill near Davenport. Some of the machinery and driving equipment is being mounted on the foundation. The company is well ahead of its schedule for erection and it is anticipated that the plant will be ready to put into operation late in the year.

The Ideal Cement Co. has recently purchased four 8 x 26 ft. compeb mills and a 4000 KW steam turbine and condenser from the Allis-Chalmers Mfg. Co. for the purpose of further improving the Portland plant at Portland, Colo. This is the plant of the Colorado Cement Co. which is one of the companies composing the Ideal Cement Co. The plant is already equipped with a very modern cement storage and packing house and the present improvements will replace the old grinding machinery, consisting of 5 x 22 ft. tube mills, No. 66 kominuter and 42 in. Fuller mills, totaling 28 machines in all, with these four simple large units, making the grinding plant as modern as any in the world today. These mills are run by direct coupled synchronous motors, the power house being the last word in economy, maintaining the power factor 95% or better.

J. E. Zahn, of the United States Portland Cement Co., addressed the annual meeting of the Cost Council of the Denver Chamber of Commerce on "The Importance of Cost Accounting to Manufacturing," recently.

Charles Boettcher, president of the Cement Securities Co., also head of the Ideal Cement Co., says that the Cement Securities Co. may have substantial claims for the refunding of federal taxes for recent years and in order to maintain its rights must continue its existence. A meeting of the stockholders was scheduled for April 29 to place the matter before them, and a request made that to carry out this suggestion, a vote be had sanctioning the holding on, but reducing the par value of its shares from $100 to one cent, thus placing the company's total capitalization at $1,000. The capitalization is ten million dollars.

Bellingham coal will be consumed in immense quantities this year by two northwestern cement plants, it is reported from Bellingham, Wash. Beginning April 1, the Olympic Portland Cement Co. will burn coal instead of oil, its daily consumption being estimated at an average of 150 tons.

The Superior Portland Cement Co.'s plant at Concrete is using Bellingham coal and has been for years, its daily consumption being twice that of the Bellingham plant.

The Pennsylvania Pump & Compressor Co., of Easton, Pa., has appointed T. J. Barry, Park Bldg., Pittsburgh, Pa., district representative for the Pittsburgh territory.

The products offered by Mr. Barry, are the Pennsylvania air compressors, both in single and double stage types, including direct connected gasoline driven portable compressors; and centrifugal pumps of the double suction single stage and multi-stage types, including a small pump for brine and water circulation, and a portable unit known as the Penway pumper; also air lift pumps.

Although there have been a number of rumors recently to the effect that there was a prospect of resumption of operations at the plant of the Choctaw Portland Cement Co., which has been closed down for some time, nothing definite has materialized with respect to operations at that plant.

An unusual feat was accomplished recently at the quarry of the Dittlinger Lime Co. of New Braunfels, Texas, when 96 holes were drilled and shot in the short space of three and one-half hours. The holes were well-drilled to an average depth of 60 ft., and then loaded with 31,050 lbs. of dynamite made into 6 x 14-in. cartridges. The result of this quickly prepared blast was 97,286 lbs. of well-broken rock. The success of the shot was attributed to the use of the large cartridges.

Announcement has recently been made by John A. Acker, assistant general manager of the New Egyptian Portland Cement Co., Pt. Huron, that over 100 men are now employed and that additions to the plant are under way.

The Newaygo Portland Cement Co. has started activities with some new and re-arranged equipment and increased output, after winter repairs.

The Allis-Chalmers Mfg. Co., Milwaukee, Wis., has recently furnished the following equipment for the dry process plant of the Brazilian Portland Cement Co., near Sao Paulo: A. C. 16-in. Superior McCully crusher; 5-ft. x 24-ft. roller type stone screen; rotary rock dryer, 6 ft. x 60 ft.; No. 726 raw grinding compeb mill arranged for direct connection to motor; dry rotary kiln, 9 ft. x 150 ft.; rotary clinker cooler 8 ft. x 70 ft.; No. 726 clinker grinding compeb mill arranged for direct connection to motor; rotary coal dryer, Ebro type, 4 ft. x 40 ft.; No. 522 compeb mill for coal, arranged for direct connection to motor.

Truck hauling of cement started in good volume in Pennsylvania in March and many heavy machines are being driven up to the mills in Coplay, Pa.

The Stearns Conveyor Co., Cleveland, which manufactures material handling equipment has just completed and shipped to the Peerless Portland Cement Co., Detroit, one of the largest portable trippers of the kind ever built. It is to be used in connection with the cement firm's operations at the plant now being erected in Detroit.

The tripper is of steel frame, with a belt equipment 54 in. wide of a Stearns design. It will handle 2,500 tons of crushed stone per hour.

The machine is driven by enclosed cut tooth gears. It provides an innovation in this style of equipment which insures starting and stopping without jar, through the use of a clutch of the automobile type.

The tripper is of the automatic, self propelling and reversing type. Special brushes have been provided on this job so that there is no danger of damp crushed stone accumulating on the belt or in any way doing damage to the machine.

The Alpha Portland Cement Co.'s plant No. 4 which was recently closed for repairs is again in operation.

The face of No. 3 quarry of the Coplay Cement Mfg. Co., for the length of more than a city block and a depth of approximately 15 ft. was recently ripped off by a large blast, 65 holes having been drilled to a depth of 175 ft.

The Whitehall Cement Manufacturing Co., Whitehall, Pa., has moved its office into its new building on Main St.

Six percent secured serial gold notes of the Pacific Portland Cement Co., Consolidated, were offered in coast cities April 3, in the amount of $2,000,000, according to word from Portland, Ore.

At a recent meeting of the stockholders of the Coplay Cement Mfg. Co., Herbert E. Steiner, president of the company announced that 1925 is looked forward to as a capacity year for that plant.

Great quantities of cement are now being used in the state of Alabama for building good roads and streets. During the past twelve months more cement has been used in road construction and street building than ever before in Alabama. Recently the Alabama state board of administration purchased 55,000 bbls. of cement from the Atlas Portland Cement Co. of Birmingham, to be used on the Birmingham-Montgomery highway. All of the cement mills of the Birmingham, Ala. district, as well as those cement mills in other sections of Alabama, are operating on full time and are finding a ready market for their products.

The Southwestern Portland Cement Co. has just completed the installation of the third Lutten mill in its raw grinding department. The three mills have replaced nine 42-in. Fuller mills and have been found clean and more economical to operate. These mills are 6 ft. x 36 ft. with two compartments, and are driven by 350 h. p. Westinghouse synchronous motors.

The plant power factor is much higher than when the old vertical motors were in operation. One of the same mills has been installed in the coal plant of the company in the place of two 42-in. Fuller mills. The pulverized coal is delivered to the kiln bins through a Fuller-Kinyon pump. This has also proved a valuable improvement.

The Newaygo Portland Cement Co. has recently organized a Safety Committee, consisting of the following members: Arthur Trexler, Chairman; George Kritzer, secretary; Sterling Barbour, Frank Robinson, Frank Race and Harley Roebuck. Meetings are to be held each Thursday.

This committee will require the cooperation of all the employees in an endeavor to make their work safe and sanitary.

H. A. Reichenbach, of Allentown, has been appointed superintendent of the Nazareth Cement Co., Nazareth, Pa., to succeed the late J. W. Louder.

The bulk cement carrier, John W. Boardman, flagship of the Huron Portland Cement Co., arrived in Alpena April 3, being the first vessel of the season to run on Lake Huron.

The six kilns at the Reliance mill of the Giant Portland Cement Co., Egypt, Pa., have resumed operations after the annual overhauling.

The Standard Portland Cement Co., Union Trust Bldg., Cleveland, Ohio, has announced the election of W. A. Davis as vice president and his appointment as sales manager.

Preliminary steps for readjustment of carload rates on shipments of cement from Texas points to Oklahoma, which will not exceed those on shipments from Oklahoma to Texas points, were taken at a hearing in Dallas recently before P. F. Galt of Washington, D. C., attorney examiner for the Interstate Commerce Commission. The Texas Portland Cement Co., represented by T. C. Taylor, submitted a complaint that lower rates exist on southbound shipments from Oklahoma. The complaint was withdrawn after J. A. Lynch representing the carriers, agreed to points designated. Evidence will be submitted in a report to the Interstate Commerce Commission for final action.

Affairs of the Beaver Portland Cement Co. were freely discussed at a largely attended meeting of shareholders recently at the company's office in Portland, Ore. The plant at Gold Hill has been closed for some time on account of the loss of a bridge out from Grants Pass, but it is expected work will continue in a short time. The following officers were re-elected: D. L. Carpenter, president; W. H. Muirhead, vice president and treasurer; L. H. Adams, secretary, and B. C. Nelson, assistant secretary.

New Quarry and Mining Shovel

A new 4-yd. full-revolving shovel designed to combine the rugged strength, power and speed of a railroad-type shovel, with the greater mobility and the full-circle swing of a revolving shovel has just been announced by the Bucyrus Company, South Milwaukee, Wis. This machine, known as the 120-B, is mounted on caterpillar tread and may be operated by either steam or electricity. It is recommended by the manufacturers for service in quarries and mines and for other work where extremely hard digging conditions are encountered.

The boom is about the same length as that on a 115-ton railroad type shovel and at the same time, its shafts are designed with from 30 to 50% greater strength than heretofore used in conservative design. Greated solidity of design is claimed for these than the heavy front end construction of a railroad type shovel. It contains refinement of design such as Superheater equipment, fire brick arch in the boiler and brass shell bearings.

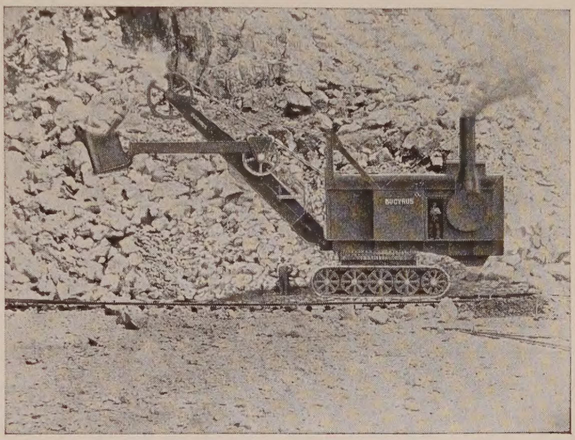


Fig. 1—New Bucyrus Shovel mounted on caterpillar tread operated by steam

It is claimed by the manufacturers that this type is the largest shovel that has yet been mounted on caterpillars and it is intended to meet the growing demand for quick acting, full revolving shovels of large dipper capacity, with greater strength, power and mobility. It is not intended for work where very wide digging and dumping reaches are required.

New Hammer Rock Drill

The accompanying illustration shows the Gilman mounted pneumatic feed drifter hammer rock drill for drilling with water under pressure. This equipment manufactured by the Gilman Manufacturing Co., East Boston, Mass., is designed for drifting or breast stoping in uniform ground and for quarrying. It is intended to meet the popular demand for a light weight, semi-automatic feed rock drill.

It embodies the principal hammer engine features of all other types of Gilman independent rotating hammer rock

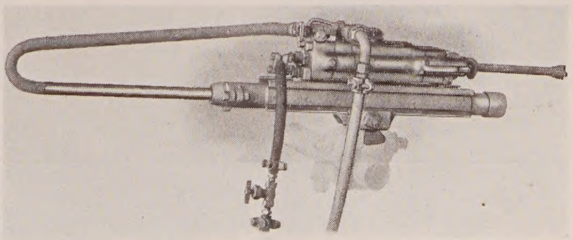


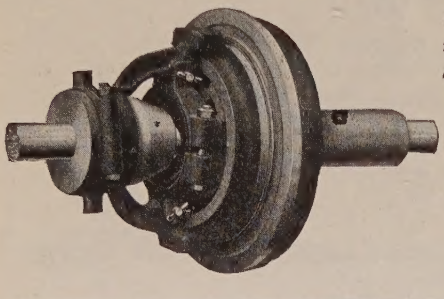
Fig. 1—The Gilman pneumatic feed drifter hammer rock drill

drills that are adapted for drilling from a mounting. It comprises, in addition, a pneumatic feed for maintaining the hammer engine and proper operative position with respect to the drill steel. According to the manufacturers, the pneumatic feed drifter has been found to be one of the most valuable innovations that has been applied to the drilling of holes in rock, because the proper feed pressure is at all times maintained upon the drill steel entirely eliminating the work of hand cranking the steel to and from the drill hole. It is at all times under the manual control of the operator.

Light Duty Clutch

The Lemley model F friction clutch has been developed by the W. A. Jones Foundry and Machine Co., Chicago, Ill., to meet the demand for a medium and light duty clutch which can be conveniently applied to practically any machine or countershaft which requires a friction clutch.

It has few parts and no special tools are required to adjust or dis-assemble completely.



The Lemley model F friction clutch

Uniform pressure on the friction surfaces is assured at all times according to the manufacturers. The two toggles are adjusted at the same time by means of one split ring nut.

Model F is furnished as sleeve clutch, cut-off couplings, or bolted to the arms of pulleys, sprockets, gears, sheaves, etc.

Electrically Driven Recording Mechanism

The accompanying figure illustrates the electrically driven recording instrument manufactured by the Brown Instrument Co., Philadelphia, Pa. Recording instruments, pyrometers, thermometers, resistance thermometers, pressure gauges, tachometers and CO^2 meters, are now supplied with a synchronous motor clock, where alternating current is available. Where only direct current is used, the instruments are usually operated off an impulse time clock system such as is used in most industrial plants. Clock-mechanism is being replaced, generally, with electric drive wherever possible.

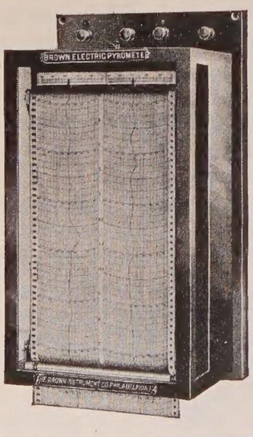


Fig. 1—Electrically driven recording instrument—the Brown electric pyrometer

Trade Publications

In publishing *Electric Locmotives for Industrial Service* Book No. 250, the Goodman Manufacturing Co., Chicago, Ill., has presented some interesting information in a very attractive manner. Book No. 250 is 8½ in. x 11 in., and is profusely illustrated with large reproductions of views showing installations of electric locomotive equipment in use in various fields, including cement mill and other quarries. Both standard and special types are shown in operation.

Other information contained in the book comes under the headings: Locomotives Types with Brief Specifications; Details of Construction, Goodman Standard Features; and Engineering Data Sheet, for Locomotive Installation.

A booklet entitled *The Manufacture of Portland Cement*, by Richard K. Meade, has been issued as a reprint from the *Johns Hopkins Alumni Magazine.* January 1925, Vol. XIII, No. 2. This book reviews, very briefly, the discovery of portland cement, the beginning of the industry in America and the growth that it has undergone to the present time.

Starting in with the composition of portland cement, the process of manufacture is outlined and a diagrammatic flow sheet included. The various kinds of equipment used are touched upon and some statistics of the industry included.

In Bulletin No. 183, entitled *De La Vergne Vertical Diesel Oil Engine, Type SI*, the De La Vergne Machine Co., New York City, illustrates the principal parts of this type of equipment as well as typical installations in use and on the testing floor ready for shipment.

It is claimed for the type SI oil engine that it is simple, reliable and has the high economy characteristic of Diesel engines. Two distinguishing features of this type of engine are the pump injection system, which does away with the high pressure air compressor and further the substitution of two simple nozzles in place of the air injection spray valve.

The Poole Engineering and Machine Co., Baltimore, Md., has issued *Bulletins 105 and 106*, descriptive of the types H and K, Poole Speed Transformer respectively. The type K reduction gear is described as a totally enclosed Herringbone spur gear drive which has been especially designed for paper mill, rubber mill and kindred industries. Installations of the two types of speed transformers are included in the bulletins.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Cement Mill Edition of CONCRETE, published monthly at Detroit, Michigan for April, 1925.

State of Michigan, }
County of Wayne, } ss.

Before me, a Notary Public, in and for the State and County aforesaid, personally appeared R. Marshall, who, having been duly sworn according to law, deposes and says that he is the General Manager of the Cement Mill Edition of CONCRETE, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse side of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Concrete-Cement Age Pub. Co., Detroit, Mich.
President—R. Marshall, Detroit, Mich.
Managing Editor—Harvey Whipple, Detroit, Mich.
General Manager—R. Marshall, Detroit, Mich.

2. That the owners are (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock):

Concrete-Cement Age Pub. Co., 1807 E. Grand Blvd., Detroit, Mich.
R. Marshall, 1807 E. Grand Blvd., Detroit, Mich.
Harvey Whipple, 1807 E. Grand Blvd., Detroit, Mich.
F. F. Lincoln, 441 Lexington Ave., New York City.
R. N. Jackson, 1807 E. Grand Blvd., Detroit, Mich.
R. W. Lesley, Pennsylvania Bldg., Philadelphia, Pa.
Edward B. Bruce, Manila, P. I.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholders or security holders appear upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers, during the six months preceding the date shown above is———. (This information is required from daily publications only.)

R. MARSHALL,
Manager.

Sworn to and subscribed to before me this 30th day of April, 1925.
(Seal.)
PERSIS E. HILL
(My commission expires August 10, 1928.)